



BY

Atelier  Riforma



ATELIER RIFORMA SRL IS AN INNOVATIVE SOCIAL  
STARTUP FOUNDED IN 2020 IN TURIN (ITALY),  
WITH THE MISSION OF

**reducing the environmental  
impact of the fashion industry,  
by fostering its transition  
towards a more circular model.**





**Our goal is to implement strategies to reduce the uncontrolled export of used clothes to the developing countries.**

**We would like, instead, to facilitate their circular and responsible management in the country of origin, through the promotion of collaborations between the various stakeholders and a greater transparency of the supply chain.**



A person is seen from behind, sorting through a massive pile of discarded clothing and fabric. The pile is composed of various items, including t-shirts, pants, and bags in different colors like blue, white, and grey. The person is wearing a red shirt and a backpack. The scene is set in what appears to be a recycling or waste management facility.

## OBJECTIVE

**Maximizing the residual value of each garment collected, distancing as much as possible the moment when it will be waste.**





# Current limits of sorting

The quality of the recovery of post-consumer textile material is strongly determined by an adequate sorting process.

Currently the sorting in the vast majority of cases is manual: the clothes are divided according to quality and to the possibility of reselling them as second-hand. The "non-reusable" fraction is destined in part for recycling and in part for disposal.

The most innovative automatic sorting technologies for textiles are based on NIR spectroscopy, which is used on non-reusable material, since it identifies only the data useful for recycling (material and color - with limits for garments composed of mixed fibers or multilayers of different materials).

Important limitation: neither in manual sorting nor in sorting with NIR Spectroscopy the characteristics of the clothes are recorded and transmitted to those who will have to deal with the recycling/reuse and this means that the sorted material cannot be highly valued.



# OUR SOLUTION

After several years of experience in the management of used clothes within the innovative social startup **Atelier Riforma**

we have created



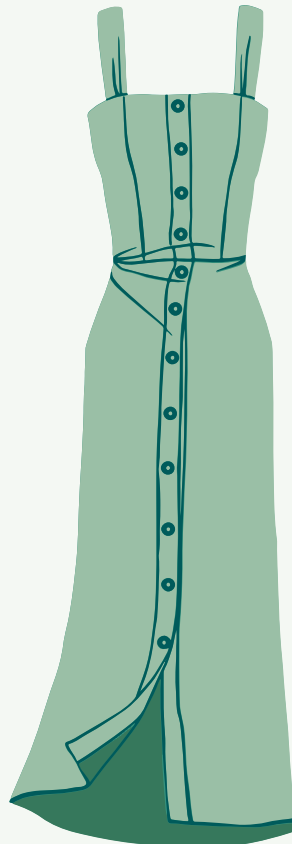
A direct and efficient **digital link** between the **entities managing used / deadstock clothing** and **circular fashion companies** that need used clothes for their business

**matching the B2B supply and demand** for discarded garments



# AI-based automated cataloging tech

**GARMENT  
IMAGE**



**TYPE OF  
GARMENT**  
ex. dress

**SEASON**  
ex. summer

**GENDER**  
ex. woman

**COLOR**  
ex. green



+

**LABEL  
IMAGE**



**SIZE**  
ex. M

**MATERIAL**  
ex. cotton (100%)

**BRAND**  
ex. Zara

Just from a photograph of the garment and of its label, Re4circular's **artificial intelligence** will be able to **extract** and **record** the data relevant for the recovery of the garment.

By coupling the image with the data, the garment can be **digitised**.

The garment can then be automatically put up for sale online.



# B2B DIGITAL MARKETPLACE



Sign up / Log in

Search by  
Category

Type of garment Season Color Gender Size Material Fabric Brand

Used clothes

Garments with defects

Brand

Type of garment ▾

Season ▾

Color ▾

Gender ▾

Size ▾

Material ▾

Fabric ▾

Quantity ▾

Sort by

- Shirt
- Dress
- T-shirt/polo
- Vest/top
- Suit/blazer
- Skirt
- Sweater
- Cardigan
- Gilet
- Shorts
- Trousers/leggings
- Coat/Fur coat
- Anorak/Jacket
- Scarf/Tie
- Hat
- Other

Remove filter

Select all on the page

ARI001534

€2

Color: Beige  
Size: Xlor52  
Quantity: 1

ARI001524

€0.05

Color: Blue  
Size: Sor36  
Quantity: 1  
Sequins

ARI001523

€1

Color: Darkgreen  
Size: Mor48  
Quantity: 1

ARI001522

€1

Color: Blue  
Size: Xlor52  
Quantity: 1

ARI001519

€1

Color: Black  
Size: Lor40  
Quantity: 1  
Sequins

ARI001518

€1

Color: White  
Size: Lor40  
Quantity: 1  
Sequins

ALL DATA AND IMAGES OF THE CATALOGUED GARMENTS FLOW DIRECTLY INTO OUR B2B DIGITAL MARKETPLACE PLATFORM, THROUGH WHICH **SELLERS** CAN WHOLESALE THEIR GARMENTS **ONLINE** TO OTHER COMPANIES

**BUYERS** ACCESSING RE4CIRCULAR MARKETPLACE CAN USE SMART **SEARCH FILTERS** AND SEARCH FOR THE GARMENTS BEST SUITED TO THEIR NEEDS, VIEW THEM AND ALL THEIR CHARACTERISTICS AND DIRECTLY **PURCHASE** THEM **ONLINE**



# EXAMPLES OF SELLERS

## COLLECTING/ SORTING ENTITIES

NEED:  
ECONOMICALLY EXPLOIT WHAT THEY  
COLLECT, LITTLE WASTE TO DISPOSE OF

## FASHION BRANDS

NEED:  
DISPOSE OF UNSOLD (OR TAKEN-BACK)  
CLOTHES, SHOW SUSTAINABILITY





# EXAMPLES OF BUYERS

## SECONDHAND SHOPS

NEED:  
NO DEFECTS, SPECIFIC  
TYPES, CHOOSE SEASON,  
GENDER, BRAND, ETC.

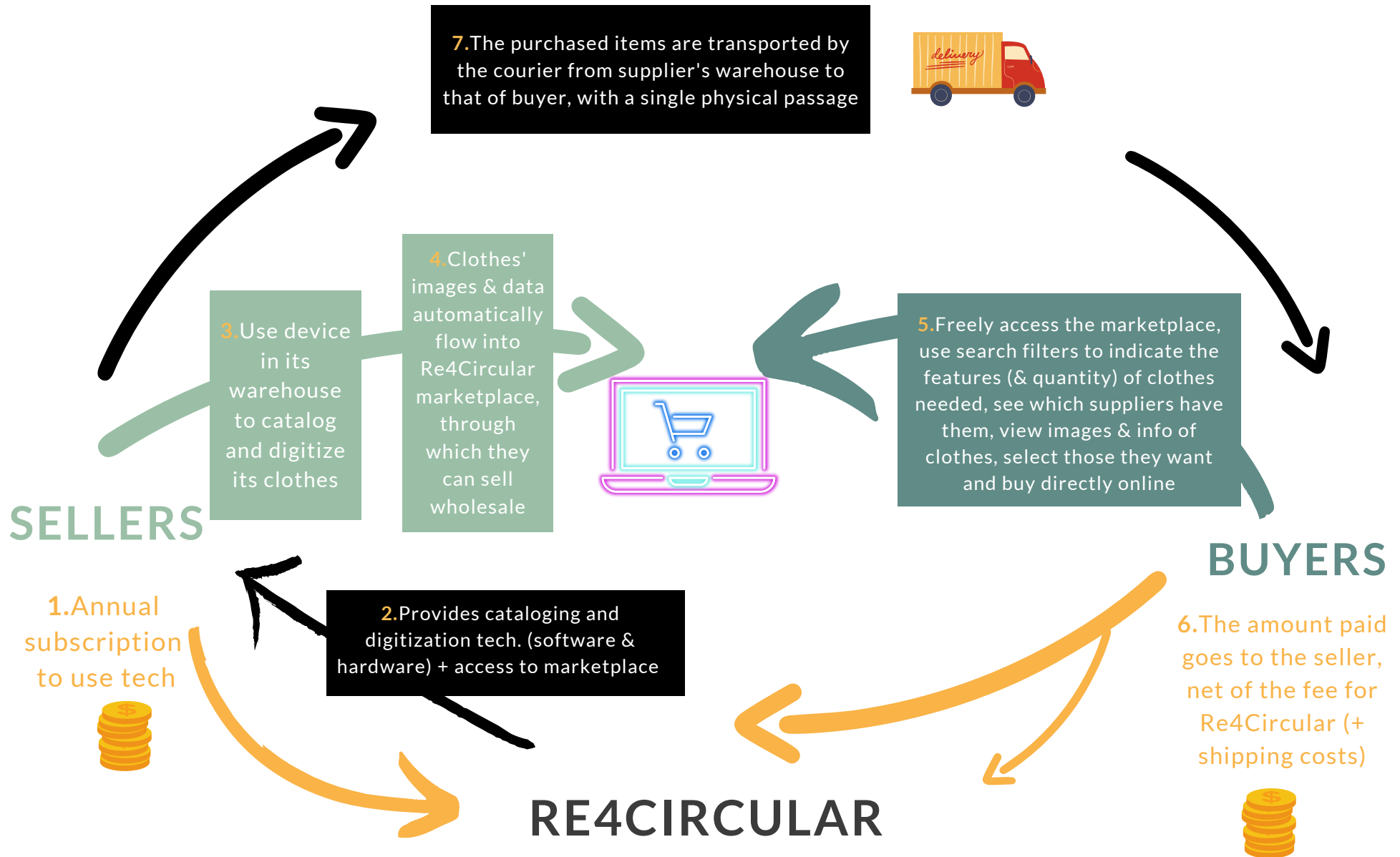
## RECYCLING COMPANIES:

NEED:  
100% SINGLE MATERIAL,  
DIVIDED BY COLOR, LARGE  
QUANTITIES

## UPCYCLING ARTISANS

NEED:  
SEE IMAGE, SMALL  
QUANTITIES, CLOTHES  
EVEN WITH DEFECTS

# PROCESS & BUSINESS MODEL





# INTELLECTUAL PROPERTY PROTECTION

## RE4CIRCULAR PATENT & TRADEMARK

- 11/2021: **provisional patent** filed (it covers the **entire process**, from automatic cataloging and recording to the marketplace platform with smart filters).
- 02/2022: "Re4Circular" **trademark registered in EU.**
- 11/2022: **definitive patent** application filed (EU)



**FOCUS ON TECHNOLOGY  
AND CURRENT STAGE OF  
DEVELOPMENT**



# Image acquisition

## PROTOTYPE STAGE (CURRENT)

Smartphone (or other device with a **camera**)  
fixed on a **C-stand** + **neutral lights**

**Image** of **garment** lying horizontally + **label**

Images shown on **PC**, with which the operator  
catalogs, **selecting parameters from drop-  
down lists**

Items placed in **progressive order** in  
containers, indicating the first and last **code** of  
the items contained

**2 operators** needed  
(1 item cataloged every **2 minutes**)



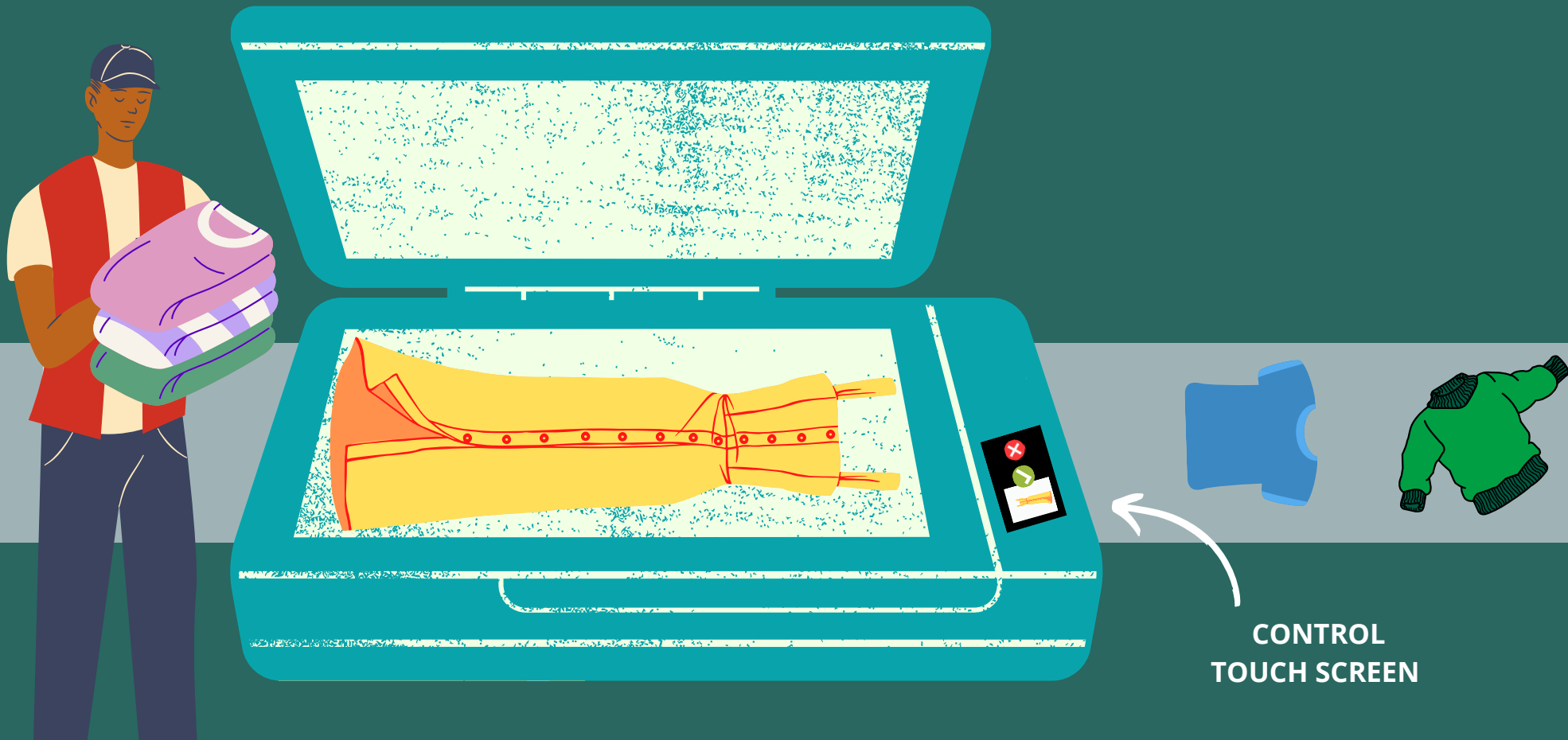
Next development phases: **AI will automatically acquire all the parameters** (except the conditions of the garment).

Software and hardware combined in a **machine** (large scanner, with control touch screen)

**NIR spectroscopy** added to AI, to identify composition of garments without label

Only **1 operator** needed (**few seconds** per garment)

## INDUSTRIALIZATION



# Only one datum remains of human competence: **garment conditions identification**

AI IS UNABLE TO **DISTINGUISH A DEFECT** (E.G. HOLE, STAIN, DISCOLORING) FROM AN INTENDED ELEMENT OF THE **DESIGN OR PATTERN** OF A GARMENT, PARTICULARLY SINCE THEY ARE ALL DIFFERENT GARMENTS.

HUMAN PRESENCE REMAINS ESSENTIAL: WE HAVE THEREFORE **MADE THE OPERATION AS FAST AS POSSIBLE** (THE OPERATOR DOES NOT REGISTER THE TYPE OF DEFECT, THEY ONLY **SELECT ONE OPTION** FROM THESE 3 ALTERNATIVES: "FLAWLESS"/"SMALL DEFECT"/"HIGHLY DAMAGED") .

THIS INFORMATION IS ESSENTIAL TO DETERMINE BOTH THE PRICE OF THE GARMENT AND ITS SUITABILITY OR OTHERWISE FOR REUSE





# DIGITAL PHASE OF THE PROCESS, AFTER IMAGE ACQUISITION

1

## Cloud database

Store images and data, updating in real time on all data additions and changes

2

## Artificial Intelligence Software for classification

Analyzes the images in real time and extracts the characteristics of the items from them (the operator can check their correctness and correct if necessary)

3

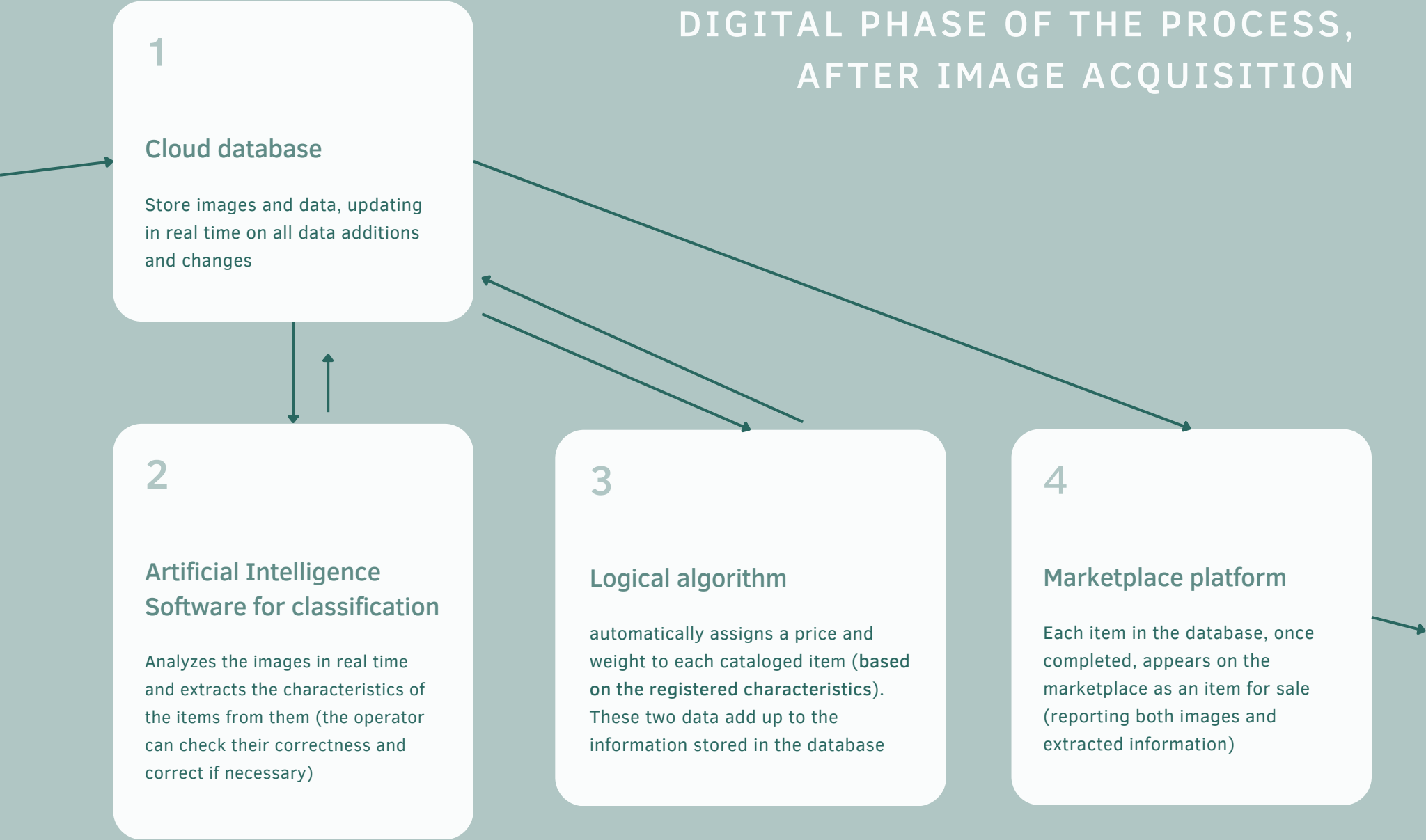
## Logical algorithm

automatically assigns a price and weight to each cataloged item (**based on the registered characteristics**). These two data add up to the information stored in the database

4

## Marketplace platform

Each item in the database, once completed, appears on the marketplace as an item for sale (reporting both images and extracted information)



**VALUE PROPOSITION**



TYPE OF GARMENT: SWEATER  
COLOR: PURPLE  
COMPOSITION: 70% WOOL; 30% ACRYLIC  
STATUS: SMALL DEFECT  
SEASON: WINTER  
GENDER: FEMALE  
SIZE: M  
LUXURY BRAND: NO



**SARTORIAL  
UPCYCLING**

# Automatic sorting of clothes

## FOR EACH GARMENT, THE MOST SUITABLE CIRCULAR DESTINATION

With Re4Circular, each garment is scanned (captured and recorded the image of the garment and its label) and thanks to the AI algorithm all the characteristics of the garment are extracted and recorded.

This surpasses current sorting technologies based on NIR spectroscopy, which identify only two data (color and material) and therefore are only useful for recycling. Taking into consideration that **not all the material is suitable for recycling**, it is also necessary to **target the other possible circular destinations** for the collected material (above all, reuse and sartorial refashioning).

Re4Circular is specifically designed to extract from the garment the characteristics that interest each of these **market** targets (not just color and material). By transmitting all these data, a **greater recovery success** can be achieved, compared to mechanical/chemical recycling alone.

Our technology is perfect for being the heart of a textile hub, as it is a tool for directing each garment to the most suitable sustainable destination, **maximizing its residual value**.





# Digitalization

## MONITORING, TRANSPARENCY AND CONNECTION WITH THE MARKET

Re4Circular not only takes care of sorting, but also of **digitization**: when the image of the garment is captured and its characteristics extracted, data automatically flows into the database, connected to the B2B marketplace platform, which allows us to put in contact the collector-selector entity with the entities that are able to give garments a new life (e.g. second-hand shops, recycling companies, sartorial refashioning brands). Through our platform, the buying and selling of garments can take place in complete **transparency** (thanks to the sharing of data and images), so we match the B2B supply and demand.

This makes it more innovative than a simple sorting technology: it is also a **direct and digital link to the market**. As well as an **analysis tool**! The data collected in the database can be used to understand the average quality of the collected clothes and the "recovery success" of the textile hub, as well as to carry out research and create reports.



# Perfect tool for work inclusion projects

## TRAINING FOR CIRCULAR JOBS

Re4Circular is **not a fully automated machine**, the **presence of 1 or 2 operators is always necessary**, in particular for the identification of the state of of the garments (which the AI is not able to identify).

This allows **jobs to be maintained**, even for disadvantaged people.

Further usefulness of human capital is in the process of preparing the material for recycling (removal of buttons, zippers, etc.), which often requires the export of garments to countries very far from ours (to then take them back), lengthening the supply chain, with further environmental impact.

Carrying out this work with internal resources would allow not only to offer a further social aspect to the project, but also to shorten a supply chain which today has enormous ecological and transparency problems.



**E-mail:**

[info@atelier-riforma.it](mailto:info@atelier-riforma.it)

Location: Turin (Italy)

**Website and landing page:**

<https://atelier-riforma.it/>

<https://re4circular.com/>

**Social Network:**

[LinkedIn](#), [Facebook](#),

[Instagram](#) e [Youtube](#)